PRACTICAL OBSERVATIONS

ON

FRACTURES

OF

THE PATELLA AND OF THE OLECRANON.

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The evils which attend the fracture of the patella when the union is not produced by ossific matter, are of so serious a nature, that the subject is well deserving the attentive consideration of the surgeon. Although in the present advanced state of surgery, when that branch of the healing art may justly claim the appellation of a science, one might hope that the treatment of this accident was so perfect as to preclude the necessity of discussion; yet the differences of opinion among some of those who deservedly rank high in the profession, and the unfortunate results which are too frequently to be met with, even in those valuable schools of surgery the hospitals of the metropolis, evince that further investigation may not be unuseful.

Fracture of the patella by external violence, is so rare an occurrence, compared to the usual mode of fracture by the sudden and forcible action of the muscles inserted into it, that the latter form of injury only will be particularized in this brief

notice. It may, however, be observed, that fracture from external injury is almost invariably accompanied with a wound; that in addition to the principles of local treatment which apply to the common fracture, those principles which regulate the general and constitutional treatment of compound fracture, complicated with the wound of a joint, must not be overlooked.

It has been the lot of the writer to witness a case which made a deep impression on his mind. A man, in an humble and laborious station in life, had suffered the common fracture of the patella, from which he had so far recovered as to resume his employment; but the union of the fractured portions of the patella was not by osseous matter, but by a considerable extent of ligament; so that the broken ends were, after the cure (if cure it can be called), far from being in contact. To those who have observed the effects of a ligamentous union after fracture of the patella, it need not be stated that this limb remained much weaker than before the accident, or than the opposite limb. One day when carrying a load, he slipped; and laceration, or tearing up of this ligament, occurred: he fell to the ground; and when the limb was examined, it was found that the ligament and the integuments adhering, were both torn across, exposing the cavity of the joint. The attempt to unite the torn edges of the wound did not succeed; —inflammation supervened;—amputation was subsequently performed; but it did not preserve the life of the sufferer.—— Another case nearly as distressing was witnessed. A female suffered a fracture of one patella, which united by ligament. Some months afterwards fracture of the patella of the opposite limb occurred. This was not more successfully treated than the former, and, after a long confinement, the poor creature was not able to walk without crutches. A considerable interval having elapsed, she could hobble without crutches, but had the misfortune to slip, and again to fracture one of the patellæ, or rather to rupture the ligament between its parts. Her confinement was longer than on either of the foregoing

occasions, and she returned to her home in a state of lameness which incapacitated her from the laborious occupation by which she had previously earned her living.

In contrast to these and other unfortunate cases, it is cheering to observe, that, under favourable circumstances, the union of the fractured patella may be anticipated with as much confidence and certainty as that of any other bone; nay, that the line of union may be so slight as not to be discovered, except by careful examination; and several successive cases might be adduced in which the union was effected without any retraction of the fractured ends, and consequently by ossific matter. In the opinion of the patients, the union was as firm as before the accident, and no lameness nor weakness remained: in each the limb was used as freely as formerly. If we examine and trace the history of any number of cases of fractured patella, it will be found that whenever the broken ends of the bone had been allowed to remain at any considerable distance apart, ligamentous union has been the consequence; whilst in others in which the broken ends had been accurately retained in contact during a sufficient length of time, perfect ossific union had taken place. The fact receives confirmation from the analogy of every day's experience, both in simple and compound fracture. We see in compound fractures, when portions of bone are removed, that if the ends are carefully retained in contact or nearly so, solid ossific union is the result, if the case terminates in recovery (for many unfortunately end fatally before the period of regeneration of bone can take place); but where the space between the ends is large, and the soft parts intervene, no solid union takes place*.

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* The writer is aware that the possibility of ossific union after fracture of the patella, is doubted by many surgeons. He is not anxious for the term, and candidly states that he is indifferent by what name the union be designated, provided that it is so perfect, that the injured part will be equally strong and useful, as before the

Having ascertained that separation of the fractured ends of the bone gives rise to the formation of an elongated ligament which has no existence in the natural structure of the part; and that the contact of broken parts, if retained undisturbed for a sufficient length of time, affords the same prospect of perfect ossific union as in any other fractured bone; it may be worth the while to ascertain the cause of the retraction, which will necessarily lead to the consideration of the means of counteracting it. If we examine a recent fracture of the patella, we shall find that the lower portion of bone retains its place, while the superior portion is drawn upwards: the explanation is obvious;—the lower portion is united to the tibia by its ligament, possessing no other power of contraction beyond its elasticity, whilst the upper portion receives the insertion of the extensors of the leg, viz. the vastus externus, vastus internus, rectus, and crureus muscles, which now having nothing to oppose them, draw the loose portion of bone upwards, or, in other words, nearer to the fixed points from which they take their origin.

As it is the natural tendency of a living muscle to contract or to shorten itself when not opposed; but as this shortening is seldom exerted with much force beyond a limited extent, we find that the mere shortening of the muscle, by bringing passively its origin and insertion nearer to each other, is generally sufficient to prevent or greatly to weaken its action. This we term relaxing the muscles. This also explains the weakness consequent on the ligamentous union.

Now, as all the muscles inserted into the patella arise from

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fracture; this result he has experienced; and has also witnessed it in cases treated by others.

Were theoretic disquisition the writer's object, few subjects would be more attractive than inquiry into the means by which nature effects restoration of parts which suffer injury; but as his object is strictly practical, he is less solicitous that his observations should appear learned, than that they should prove useful.

the thigh-bone, one only of them, the rectus excepted, having origin from the front of the pelvis, it becomes an obvious inference, that, to bring the origins and insertion as near to each other as the natural motions of the body will permit, the leg must be brought into a right line with the thigh and the thigh be raised towards the front of the pelvis, or otherwise the pelvis be bent forwards upon the thigh: and in practice it will be found that this position nearly accomplishes the indication of keeping the broken ends of the bone together; or at least renders the slightest force sufficient, when properly directed, to retain them steadily in contact.

Let it be laid down as an axiom, that the means to be used for the relief of any injury or disease shall be the least painful consistently with the welfare of the patient, and we shall have little difficulty in selecting, for this particular purpose, such as will perfectly answer the proposed end, and at so little inconvenience to the patient, that, after the swelling and tension which generally accompany the injury, have had time to subside (seldom exceeding two or three days), the state of absolute rest of the limb will be almost the whole of the inconvenience which it is necessary for him to submit to; and even this absolute rest may, under careful management, be departed from without injury, were any great advantage to be gained thereby; but whatever may be the supposed éclat of a patient *walking* (if moving about on crutches can deserve the term), within the first few days after a fracture of this nature, a prudent surgeon will not risk the safety of his patient, which might be endangered by so slight an accident as the slipping of a crutch, for so empty a gratification.

The muscles having been relaxed by the position above alluded to, let the surgeon compress the broken portions of the bone gently between his fingers and thumbs, using the fingers to one portion and the thumbs to the other, increasing the pressure until the upper portion be in perfect contact with, and apposition to the lower. Let him observe the extent of force which is necessary to effect this accurate apposition;

and he will find, that a force equivalent to a few ounces in weight will suffice; if the relaxed position of the muscles have been well observed. Let those who may be of opinion that the aid of the mechanical powers is required to effect this simple purpose, examine well this part of the treatment, and if a doubt remain, rather remove the support of the fingers from the upper portion, and again observe how slight a force will suffice to bring it back to its natural position; for, in truth, no pain nor inconvenience will be experienced from any part of the treatment, unless the force used exceed the necessity of the case; and the patient, so far from complaining, will be more apt to express his satisfaction at the comfortable degree of support which either the hand, or the apparatus, subsequently to supply its place, affords him*.

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* The dangers of the immense increase of power afforded by mechanism, particularly the compound pullies, and still more the screw, might be demonstrated by mathematical computation: but this can scarcely require elucidation, were it not that there are many circumstances, nay even minutiæ, useful for the student to know, which no one would think of offering to the attention of the well-informed practitioner. The principle, that what is lost in velocity is gained in power, and *vice versa*, must be familiar to every one versed in mechanics.

Suppose a screw one quarter of an inch diameter and forty threads to the inch, moved by a thumb-screw (a double lever), of two inches from one extremity to the other.

Suppose one pound, or a power equal to that weight, to be applied to the extremity of each lever. The distance of the two extremities of the levers, representing the diameter of the circle, and being equal to two inches, the power applied must at every revolution move through a space equal to six inches, the circumference of the circle: consequently, if there be forty threads of the screw to the inch, the power must move through the space of forty times six inches, or two hundred and forty inches, to gain one inch upon the screw, the power gained being equal to the loss of velocity; and two hundred and forty times two pounds must be equal to four hundred and eighty, deducting the trifling loss occasioned by friction: a power, in unskilful hands, capable of effecting incalculable

The apparatus may be very simple: the writer has generally used strips of plaster of about an inch in breadth and a foot long, crossing obliquely from the integuments immediately above the patella to the upper and back part of the leg, the patella being within the angle formed by the crossing. This, he has believed, rendered the bandage and compress less liable to slip, but he does not consider the plaster essential. A moderate-sized compress has been then placed immediately

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injury! This must be obvious when it is recollected that the mere weight of a limb resting upon a small surface, as that of the heel, a comparatively trifling pressure, when long continued, is sufficient to destroy the life of the part, and produce mortification.

The trouble of using a screw, or other mechanical contrivance, is so much less than that of computing its power, that, were the writer to presume to convey instruction to the surgeon who has faithfully studied his profession, he would have abstained from offering so simple a demonstration; yet the intelligent surgeon will be the most likely to excuse those suggestions which may be superfluous to himself, provided they be calculated to induce a habit of reflection in others, who may not have had the same practical opportunity of extended and accurate observation, or the like foundation in the elements of general science.

The feeling, that principles, long familiar to those who have clearly appreciated them and carried them successfully into practice, must be so generally known to others, as to render any communication respecting their application to individual cases a work of supererogation, has probably prevented many excellent practical surgeons from offering their observations to the public.

That complications and violence, beyond the exigencies of the accidents or diseases for which they have been employed, have been as discreditable to the intellect of those who have used them, as they have been injurious to the unfortunate sufferers, the history of surgery will abundantly testify. Many instances of complicated treatment, followed by recovery, cannot disprove the propriety of reducing the means employed to the greatest simplicity and usefulness;—but it would be almost a hopeless task to attempt to convince any one who would fire a gun to kill a fly, that such a procedure were needless and absurd.

above the patella, the ends bending downwards on each side, so that the bandage has rested upon it, and has produced an equable and steady, though moderate, compression, in a direction opposite to that of the extensor muscles; thereby counteracting any contraction which, under the previously detailed circumstances, they may be likely to exert. A narrow double-headed flannel bandage has been generally preferred, on account of its greater elasticity than linen or calico. A splint may or may not be placed in the ham. If the steadiness of the patient can be depended upon, the splint may be dispensed with,—if his steadiness be doubtful, the splint had better be used. The bandage may be applied in any convenient manner, forming a sort of fulcrum by the use of pins whenever it becomes necessary to change the direction of the bandage, so as to make it bear particularly upon any required point. It is not likely that any one expert in the use of the roller, and having a clear idea of the object to be attained by its application, will fail in giving the necessary support where it is required *. The bandage should not be so tight as to cause the leg to swell, otherwise the lower part must be also supported. There is an advantage in leaving the patella uncovered, as it enables the surgeon not merely to suppose that the ends of the bone are steadily supported in contact, but to assure himself of the fact, day by day, without disturbing the apparatus, unless any slipping of the bandage or slight retraction of the upper portion of the bone should render it necessary.

But it is not mere mechanical management, however excellent it may be, that can satisfy all the indications of surgical

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* The roller should be so applied that support must also be given to the lower portion of the fractured patella, so as to keep it steadily in contact with the upper portion. The ligament of the patella connecting it with the tibia, prevents the lower portion being carried higher than its natural situation; but there is little beyond the resistance of the integuments to prevent its yielding, to a certain degree, downwards.

treatment. An intimate acquaintance with the feelings and workings of human nature is as essential, as the more obvious requisites in demonstrative science. The intelligent surgeon will not content himself by applying an apparatus, and trusting to chance that which may be secured by proper attention. The passive state of the muscles of the limb is essential to the welfare of the patient; if that welfare is to be attained at the least possible amount of inconvenience: suffering, in cases of fracture of the patella, is almost, if not entirely, out of the question, under proper regulation. This passive state of the muscles may be generally attained, if the mind of the patient be properly directed*.

If the swelling before reduction be great, the free application of leeches should precede the use of the bandage, the position being made as favourable as may be, without delay. Cold or evaporating applications may be used, if supposed necessary, by moistening the bandage, without removing it.

After the first few days it may be ascertained that a very slight degree of flexion of the knee, sufficient to relieve the irksomeness of the constantly extended position, may be permitted without at all deranging the apposition of the ends of

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* The writer has witnessed instances in which the ascendancy of a firm and intelligent friend, over the mind of a timid patient, has acted like a charm, in instantly allaying the spasmodic twitchings of the muscles of a limb, which had suffered fracture or dislocation. In a case of fracture of both tibia and fibula, complicated with dislocation of the ankle joint, these spasms were so violent as on one occasion to reproduce the dislocation. The patient was dreadfully alarmed. The reduction was easily effected, and his mind calmed; but for several days, recurrence of spasm supervened, and gradually increased in violence, whenever the patient's mind became agitated or alarmed; until the powerful influence of a friend, who watched by his bedside, checked the train of thought which produced the involuntary agitation of the limb—and immediately restored tranquillity. The wife of the patient, although attentive and affectionate, possessed no such power over his mind.

the bone; but where the limb rests not merely upon the heel, but is equably supported, this will scarcely be called for.

The patients have been allowed to move about upon crutches as soon as they have desired it, supporting the injured limb in a broad sling passed over the shoulder, and preventing the foot touching the ground. At the end of a month they have been allowed to use the foot upon the ground, but not to bend the knee; but the extent of exercise permitted may in a great measure be regulated by the feelings of the patient. By allowing gentle motion as soon as he feels the parts so strong as to induce him to desire it, much of the stiffness consequent on rigid confinement will be obviated. In each instance, with the above precautions, the treatment has not exceeded six weeks*.

The analogy between the fracture of the patella and that of the olecranon is so striking, that it can scarcely have escaped the notice of the attentive observer.

The fracture of the olecranon differs however from that of the patella in the mode of its production, being the result of

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* Since this volume was committed to the press, Mr. Rayne has been rewarded by the Society for the Encouragement of Arts, &c. for an apparatus for the treatment of fracture, and another for that of dislocation of the patella. Both possess considerable ingenuity of contrivance, and, under certain circumstances, may be beneficial. Believing, as the writer does, that all unnecessary complications in surgical apparatus ought to be avoided, and convinced by experience that perfect union of the fractured patella may be obtained by very simple means, under careful and judicious management, he is not insensible of the advantage which may be derived from Mr. Rayne's apparatus, in those unfortunate cases (the more to be deplored, as, by adequate care and skill, they may be prevented), in which a ligamentous and elongated union only has been effected. In such cases this apparatus, having a strong spring in a great measure supplying the place of the lost power of the extensor muscles, must be very valuable. The cost of that adapted to this purpose, the writer believes, is three guineas; that for the dislocation two guineas.

external violence, and not of the too violent action of the muscles inserted into it Generally the accident happens by the patient falling upon the elbow when the forearm is bent upon the arm, the shock of the whole weight of the body being received upon this projecting point of bone. In many instances the patients were in the act of running when the fall occurred, by which the shock was increased.

The mode of union after fracture of the olecranon varies according to circumstances: it is often effected by a ligament, elongated in proportion to the retraction of the broken portion of bone, when that has been considerable during the period that regeneration of bone usually takes place. In this instance the power of extending the forearm is greatly diminished; whilst the natural support afforded by the extremity of the bone to prevent the too great extension of the forearm being lost, the forearm may, by external force, be carried backwards beyond the direct line of the humerus.

Another mode of union takes place when the broken portion has not been kept sufficiently near to the part from which it has been separated; yet not so distant as to prevent ossific union. Consequently the extremity of the bone projects further than natural, the forearm cannot be fully extended, and considerable inconvenience and lameness result. When this mode of union occurs, there is frequently great irregularity and enlargement of the bone at the place where it has united.

The third and most desirable termination is when, by proper care, a perfect osseous union is effected. To show that this may be generally, if not universally attained, is the object of the following remarks.

In any of these, but particularly in the two former modes in which this accident terminates, considerable lameness, varying from a very limited degree of flexion and extension to an almost total immobility of the elbow joint, may remain, arising from rigidity of the joint or parts surrounding it.

The elongated ligamentous union can only happen under

extremely imperfect or misapplied treatment, or by the total absence of any treatment; the action of the triceps muscle being sufficient, when not counteracted, to produce very considerable drawing up of the fractured portion, and thus to remove it from its natural position. It has even occurred, that surgical treatment has been so far mistaken, that a bandage has been applied round the limb, without bringing down the fractured portion to its natural situation!

The discussion of the causes which prevent the perfect and ossific union of fractures in general, although a subject of deep interest, cannot here be entered upon, consistently with the proposed limit of this communication, the object of which will be answered, if it be shown, how, in regard to the particular instances attempted to be elucidated, this unfortunate termination may be prevented.

Were surgeons to reflect upon the protracted inconveniences, not to give them a harsher name, suffered by individuals in humble life, by the management of their cases being trusted to pupils who have not acquired either the dexterity to perform, or the experience to regulate the treatment, instances of bad surgery would become extremely rare; for unfortunately they often occur under the sanction of names of surgeons justly celebrated for their skill, whose professional knowledge cannot be called in question; and whose humanity, as far as good intentions are concerned, must be above suspicion. But what can compensate an humble patient, doomed to incurable lameness or protracted suffering, which might have been averted?

The subject is of too deep interest to humanity to admit of personal feelings: nay, when truth is opposed to long-established usage, it often requires the sacrifice of personal considerations for a humble individual to dare to allude to it;—but let him dare—he may be blamed: but if once the subject be dispassionately considered by those who have the power to remedy the evil,—the writer knows them to be too humane to persist in dangerous error.

It may be objected, How can students acquire the practical

knowledge of surgery without actual practice? The answer is very plain: simply by ensuring that adequate instruction and observation shall have preceded practice; and that practice be not permitted to take place on the *living* body, until the competency to that trust be ascertained. The writer could adduce numerous facts illustrative of the evils to which he has thus briefly alluded—he could also adduce examples, which he considers worthy of imitation, by which these evils were avoided: but he abstains; in the hope, that such illustration may be rendered unnecessary.

To return, however, from this digression. A female, aged between twenty and thirty, slipped in the street when running, and fell upon her right elbow. She went to Mr. —— (a druggist), who furnished her with a lotion. She was unable to work, and could not even feed herself with her right hand. At the end of a week, not finding herself any better, she went to —— hospital, where she was made out-patient under ——; "but whatever was done to it" (her arm), "was done by the young gentlemen about, sometimes by one, sometimes by another." She was told that the bone at the elbow was broken. Two splints and bandages were applied, and the arm was kept straight. She states that thrice she was told the bone had got out of place. She wore the splints for two months, and used lotion to keep it wet. The bandages were continued a month or two longer. "It was a full twelvemonth before she could use the arm so as to feed herself; she could not use any force without pain; neither was she able to do her work during that time—she could not even wash a shirt." Gradually she recovered.

At the distance of four years from the accident, there remained very considerable enlargement and deformity of the ulna, about an inch and a half from the extremity of the olecranon. She could not extend the arm so perfectly as the other; neither could she perform laborious work with the same facility as before the accident.

Feb. 1820. I was requested to examine the arm of a

youth who had been *nominally* a patient of ——, a distinguished surgeon, at ——'s hospital. "He had had fracture of the olecranon, but by slipping or falling had injured it twice since the original accident. The first time it was put up in the extended position, the second, partly bent. There is irregularity of the bone at the place of the fracture, which is now firm; but he enjoys a very limited motion of the elbow joint, it being nearly fixed in the extended position. He cannot carry his hand to his head, nor even his knife or spoon to his mouth, with the injured limb. It is evidently the defect or rigidity of the muscles, &c. It is now fourteen weeks since the accident."

It is obvious that the simple principles of practice in fracture of the olecranon are, first, to diminish the swelling which the violence necessary to produce fracture generally occasions; —to guard against inflammation;—to replace the fractured portion, and keep it steadily in its natural position; to relax the muscle (the triceps) inserted into it; to prevent rigidity of the joint by appropriate exercise, as soon as the union becomes sufficiently firm to admit of it with safety;—but an ordinary example may supply the place of further detail.

Sept. 20, 1820. A young man, aged twenty, was thrown out of a gig, and fell upon his right elbow. His face and right hip were also injured. The swelling of the elbow was so great, as to prevent the examination by the touch being satisfactory; although the inference was clear, from the manner in which the accident had occurred, and the extent of injury around the elbow, that the olecranon must have suffered fracture. Treatment—bleeding, both general and topical; purging; low diet; and cold applications to the injured parts: to rest the arm.

Sept. 24. The swelling of the elbow was so much reduced as to admit the existence of fracture to be distinctly ascertained. The olecranon was broken off and drawn upwards. The fracture was reduced; and the detached part kept down by compress, adhesive strips, and bandage; the arm put in

the extended position, and a hollowed splint placed in front of the elbow joint, to prevent accidental flexure.

Oct. 4. No pain. "There is no crepitus now perceptible. The broken portion is perfectly in place, and resists the slight force which can be prudently used in examination."

6th. Arm firmer;—bandage adjusted.—It is needless to state the daily progress. The olecranon united so perfectly in its natural place, that it required careful examination to distinguish it from that which had not been injured. For some time after leaving off the splint the motion of the joint was checked, no doubt from having been kept stationary in the extended position; but by daily using, at first, passive flexion; and afterwards, swinging the forearm with a small weight in the hand, the use of the joint was perfectly restored. Friction was combined with this exercise.

He was perfectly well by the end of October.

PICCADILLY,
Nov. 1821.